

# Proportional pressure relief valve with on-board electronics (OBE) and position feedback

RE 29151/07.05

1/10

## Type DBETBEX

Nominal size 6  
Unit series 1X  
Maximum working pressure P 315 bar, T 250 bar  
Nominal flow rate  $Q_{\text{nom}}$  1 l/min



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## Features

- Directly operated valves with position feedback and on-board electronics for limiting system pressure
- Adjustable through the position of the armature against the compression spring
- Position-controlled, minimal hysteresis <0.2%, rapid response times, see Technical data
- Pressure limitation to a safe level even with faulty electronics (solenoid current  $I > I_{\text{max}}$ )
- For subplate attachment, mounting hole configuration to ISO 4401-03-02-0-94. Subplates as per catalog sheet RE 45053 (order separately)
- Plug-in connector to DIN 43563-AM6, see catalog sheet RE 08008 (order separately)
- Data for the on-board trigger electronics
  - Complies with CE, EMC directives EN 61000-6-2: 2002-08 and EN 61000-6-3: 2002-08
  - $U_{\text{B}} = 24 V_{\text{nom}}$  DC
  - Electrical connection 6P+PE
  - Signal actuation
    - Standard 0...+10 V (A1)
    - Version 4...20 mA (F1)
  - Valve curve calibrated at the factory

### Ordering data

DBETB	E	X	-1X/	G24	K31		M	*
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Proportional pressure relief valve with inductive position transducer on the cone

With on-board electronics = E

Mounting hole configuration to ISO 4401-03-02-0-94 = X

Unit series 10 to 19 (10 to 19: installation and connection dimensions unchanged) = 1X

**Max. pressure stage**

up to 80 bar = 80  
 up to 180 bar = 180  
 up to 250 bar = 250  
 up to 315 bar = 315

Voltage supply of trigger electronics = G24  
 24 V DC

Further information in plain text

M = NBR seals, suitable for mineral oils (HL, HLP) to DIN 51524

**Interface for trigger electronics**

A1 = Setpoint input 0...+10 V  
 F1 = Setpoint input 4...20 mA

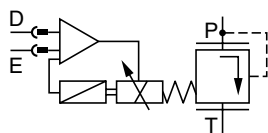
K31 = **Electrical connection without** plug-in connector, with unit plug to DIN 43563-AM6  
 Order plug-in connector separately

### Preferred types

Type .....A1 (0...+10 V)	Material Number	Type .....F1 (4...20 mA)	Material Number
DBETBEX-1X/80G24K31A1M	0 811 402 072	DBETBEX-1X/80G24K31F1M	0 811 402 140
DBETBEX-1X/180G24K31A1M	0 811 402 071	DBETBEX-1X/180G24K31F1M	0 811 402 075
DBETBEX-1X/250G24K31A1M	0 811 402 073	DBETBEX-1X/315G24K31F1M	0 811 402 141
DBETBEX-1X/315G24K31A1M	0 811 402 070		

### Symbol

For on-board electronics



## Function, sectional diagram

### General

Type DBETBEX proportional pressure relief valves are remote-controlled (pilot) valves in conical seat design. They are used to limit system pressure.

The valves are actuated by means of a proportional solenoid with on-board electronics.

With these valves, rapid response times with low hysteresis can be achieved.

### Basic principle

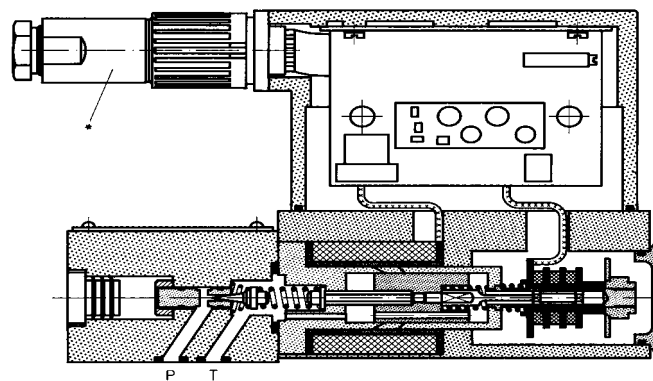
To adjust the system pressure, a setpoint is set in the trigger electronics. Based on this setpoint, the electronics control the position of the armature on the conical seat and on the compression spring.

The position control ensures extremely low hysteresis. The magnetic force determines the spring force until a new position is reached.

### Pressure limitation for maximum safety

If a fault occurs in the electronics, so that the solenoid current ( $I_{\max}$ ) would exceed its specified level in an uncontrolled manner, the pressure cannot rise above the level determined by the maximum spring force.



CE EN 61000-6-2: 2002-08  
EN 61000-6-3: 2002-08



Valve body

Proportional solenoid with position transducer

### Accessories

Type		Material Number
(4 x)  ISO 4762-M5x30-10.9	Cheese-head bolts	2 910 151 166
* 	Plug-in connectors 2P+PE, see also RE 08008.	KS
		KS
		MS
		MS
		KS 90°
		1 834 482 022
		1 834 482 026
		1 834 482 023
		1 834 482 024
		1 834 484 252

### Testing and service equipment

Test box type VT-PE-TB3, see RE 30065

Measuring adapter 6P+PE type VT-PA-2, see RE 30068


## Technical data

General	
Construction	Poppet valve
Actuation	Proportional solenoid with position control and OBE
Connection type	Subplate, mounting hole configuration NG6 (ISO 4401-03-02-0-94)
Mounting position	Optional
Ambient temperature range	°C -20...+50
Weight	kg 2.7
Vibration resistance, test condition	Max. 25 g, shaken in 3 dimensions (24 h)

### Hydraulic (measured with HLP 46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )

Pressure fluid	Hydraulic oil to DIN 51524...535, other fluids after prior consultation				
Viscosity range	recommended	mm <sup>2</sup> /s	20...100		
	max. permitted	mm <sup>2</sup> /s	10...800		
Pressure fluid temperature range	°C	-20...+70			
Maximum permitted degree of contamination of pressure fluid Purity class to ISO 4406 (c)	Class 18/16/13 <sup>1)</sup>				
Direction of flow	See symbol				
Max. set pressure (at $Q = 1\text{ l/min}$ )	bar	80	180	250	315
Minimum pressure (at $Q = 1\text{ l/min}$ )	bar	3	4	5	8
		Note: At $Q_{max} = 1.5\text{ l/min}$ the pressure levels stated here increase			
Max. mechanical pressure limitation level, e.g. when solenoid current $I > I_{max}$	bar	<85	<186	<258	<325
Max. working pressure (at $Q = 1\text{ l/min}$ )	bar	Port P: 315			
Max. pressure	bar	Port T: 250			

### Static/Dynamic

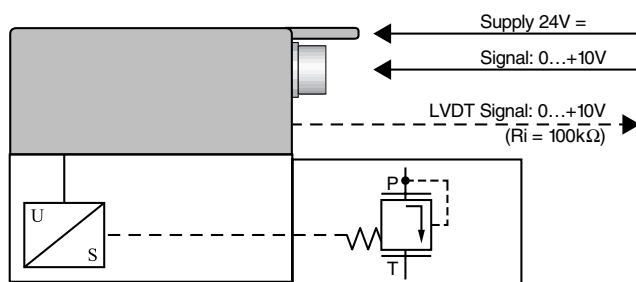
Hysteresis	%	$\leq 0.2$
Range of inversion	%	$\leq 0.1$
Manufacturing tolerance	%	$\leq \pm 5$
Response time	100% signal change	ms 30
	10% signal change	ms 10
Thermal drift	<1% at $\Delta T = 40\text{ °C}$	
Conformity	 EN 61000-6-2: 2002-08 EN 61000-6-3: 2002-08	

<sup>1)</sup> The purity classes stated for the components must be complied with in hydraulic systems. Effective filtration prevents problems and also extends the service life of components. For a selection of filters, see catalog sheets RE 50070, RE 50076 and RE 50081.

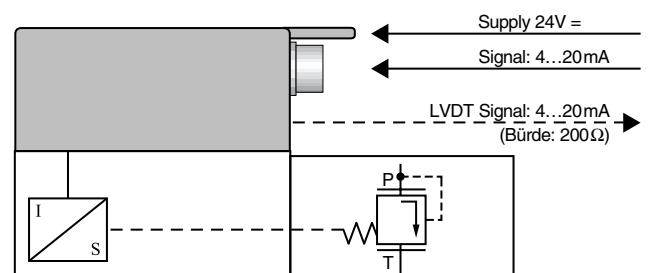
## Technical data

Electrical, trigger electronics integrated in valve		
Cyclic duration factor	%	100
Degree of protection		IP 65 to DIN 40050 and IEC 14434/5
Connection		Plug-in connector 6P+PE, DIN 43563
Supply voltage		24 V DC
Terminal A:		Min. 21 V DC/max. 40 V DC
Terminal B: 0 V		Ripple max. 2 V DC
Power consumption		Solenoid $\square$ 45 mm = 40 VA max.
External fuse		2.5 A <sub>F</sub>
Input, "standard" version	A1	Differential amplifier, $R_i = 100 \text{ k}\Omega$
Terminal D: $U_E$		0...+10 V
Terminal E:		0 V
Input, "mA signal" version	F1	Burden, $R_{sh} = 200 \Omega$
Terminal D: $I_{D-E}$		4...20 mA
Terminal E: $I_{D-E}$		Current loop $I_{D-E}$ feedback
Max. voltage to differential inputs over 0 V		$D \rightarrow B$ } max. 18 V DC $E \rightarrow B$ }
Test signal, "standard" version	A1	LVDT
Terminal F: $U_{\text{test}}$		0...+10 V
Terminal C:		Reference 0 V
Test signal, "mA signal" version	F1	LVDT signal 4...20 mA at external load 200...500 $\Omega$ max.
Terminal F: $I_{F-C}$		4...20 mA output
Terminal C: $I_{F-C}$		Current loop $I_{F-C}$ feedback
Safety earth conductor and shield		See pin assignment (installation in conformity with CE)
Recommended cable		See pin assignment up to 20 m 7 x 0.75 mm <sup>2</sup> up to 40 m 7 x 1 mm <sup>2</sup>
Calibration		Calibrated at the factory, see valve curve

### Version A1: Standard

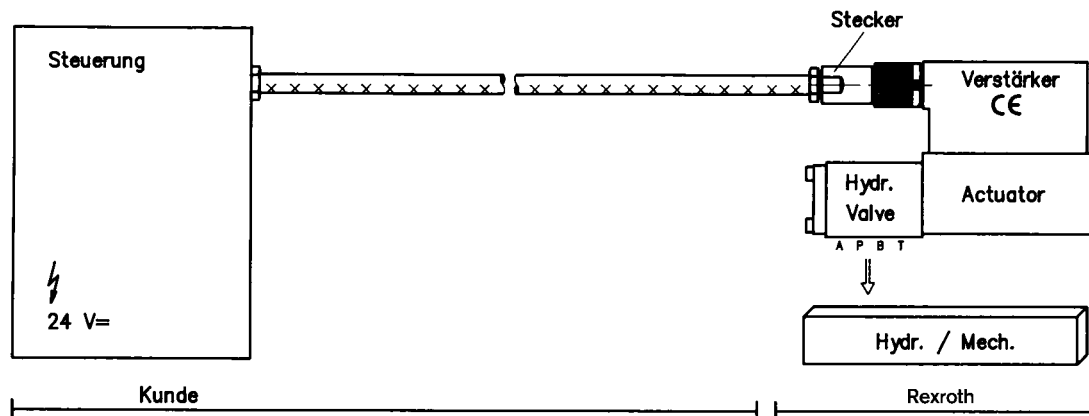


### Version F1: mA signal



## Connection

For electrical data, see page 5  
and Operating Instructions 1 819 929 083



### Technical notes for the cable

- Version:**
- Multi-wire cable
  - Extra-finely stranded wire to VDE 0295, Class 6
  - Safety earth conductor, green/yellow
  - Cu-braided shield
- Type:**
- e.g. Ölflex-FD 855 CP (from Lappkabel company)
- No. of wires:**
- Determined by type of valve, plug type and signal assignment
- Cable Ø:**
- 0.75 mm<sup>2</sup> up to 20 m long
  - 1.0 mm<sup>2</sup> up to 40 m long
- Outside Ø:**
- 9.4...11.8 mm – Pg11
  - 12.7...13.5 mm – Pg16

### Important

Voltage supply 24 V DC nom, if voltage drops below 18 V DC, rapid shutdown resembling "Enable OFF" takes place internally.

In addition, with the "mA signal" version:

$I_{D-E} \cong 3 \text{ mA}$  – valve is active

$I_{D-E} \cong 2 \text{ mA}$  – valve is deactivated.

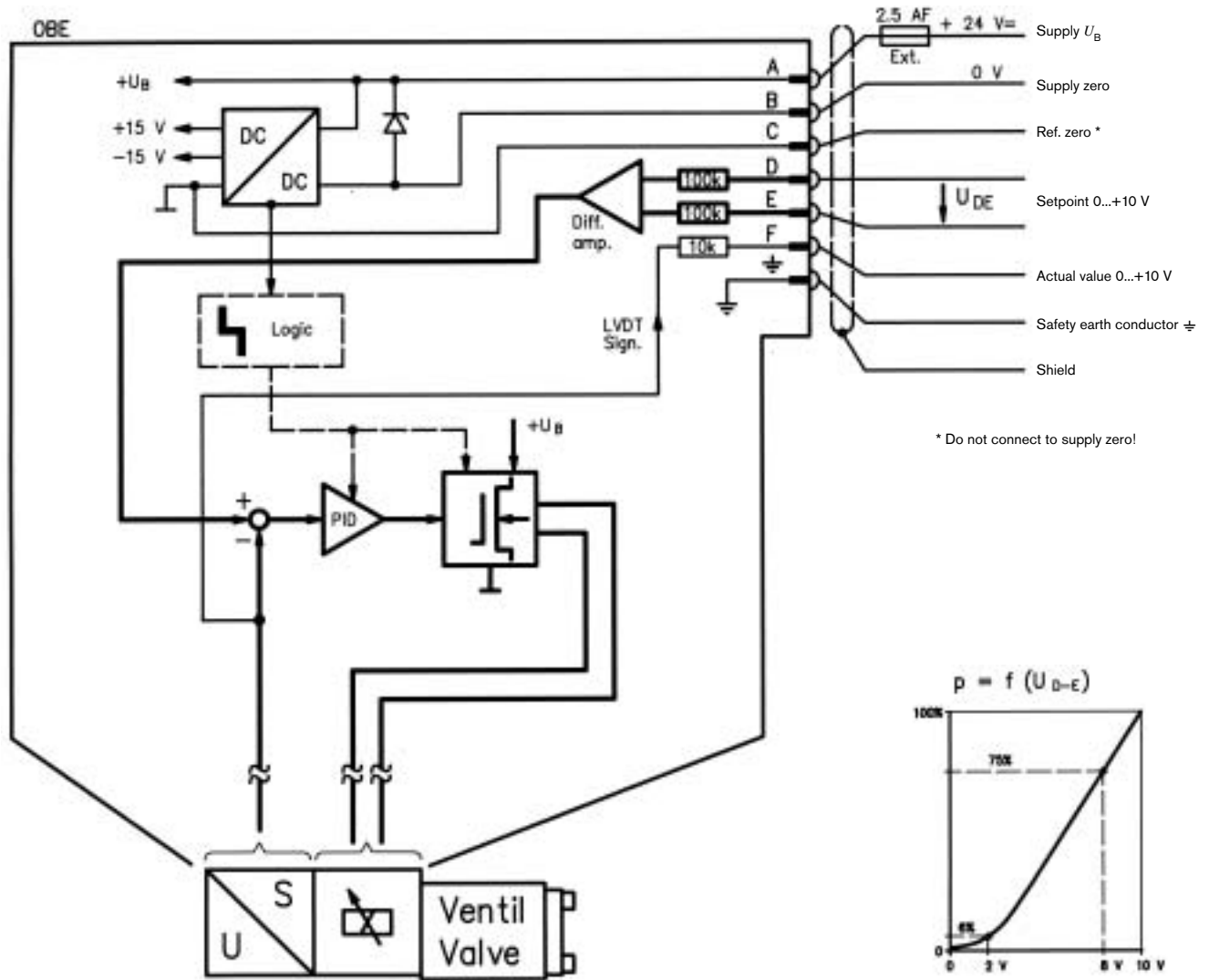
Electrical signals emitted via the trigger electronics (e.g. actual values) must not be used to shut down safety-relevant machine functions!

(See also European Standard, "Technical Safety Requirements for Fluid-Powered Systems and Components – Hydraulics", EN 982.)

### On-board trigger electronics

#### Circuit diagram/pin assignment

Version A1:  $U_{D-E}$  0...+10 V

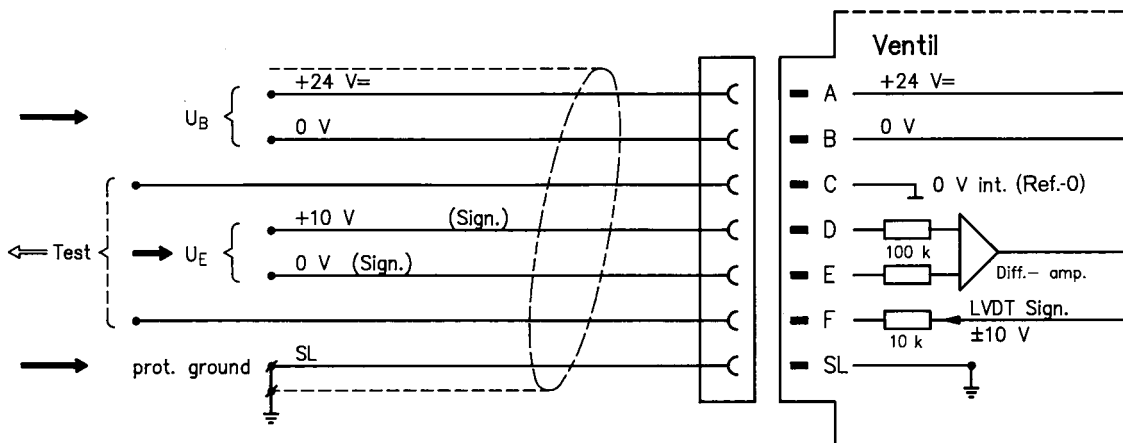


\* Do not connect to supply zero!

#### Pin assignment

Version A1:  $U_{D-E}$  0...+10 V

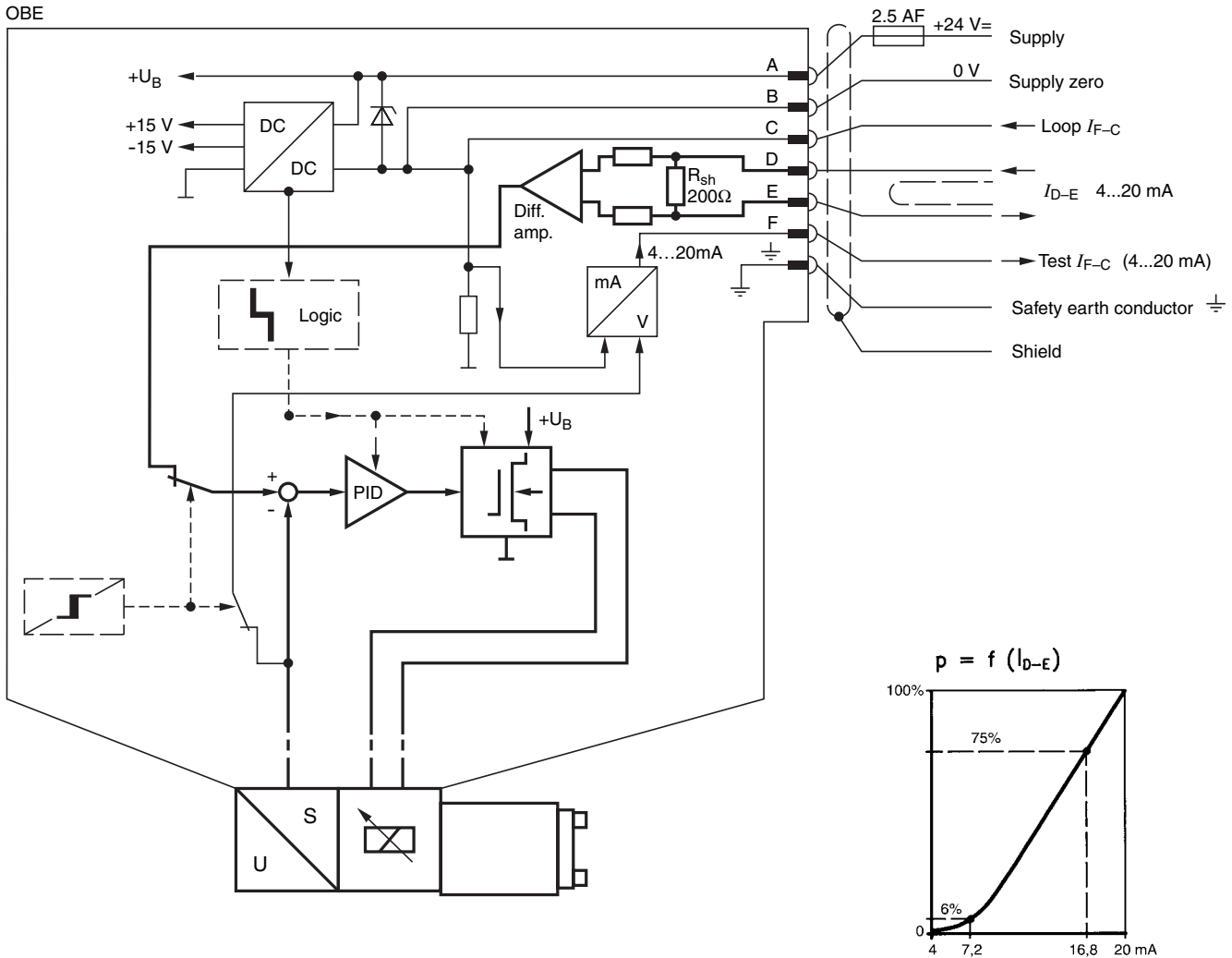
( $R_i = 100 \text{ k}\Omega$ )



### On-board trigger electronics

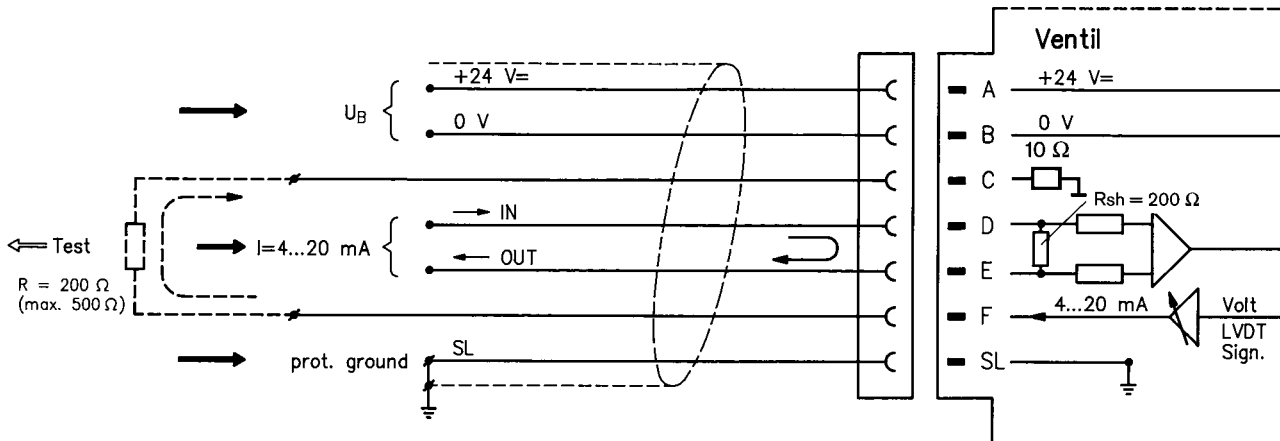
#### Circuit diagram/pin assignment

Version F1:  $I_{D-E}$  4...20 mA



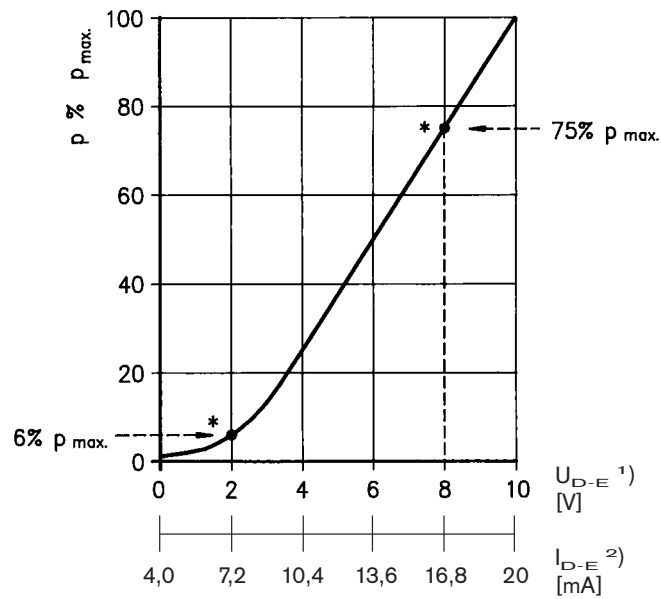
#### Pin assignment

Version F1:  $I_{D-E}$  4...20 mA  
 ( $R_{sh} = 200 \text{ k}\Omega$ )



## Characteristic curve (measured with HLP 46, $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$ )

Pressure in port P as a function of the setpoint  
Nominal flow rate = 1 l/min

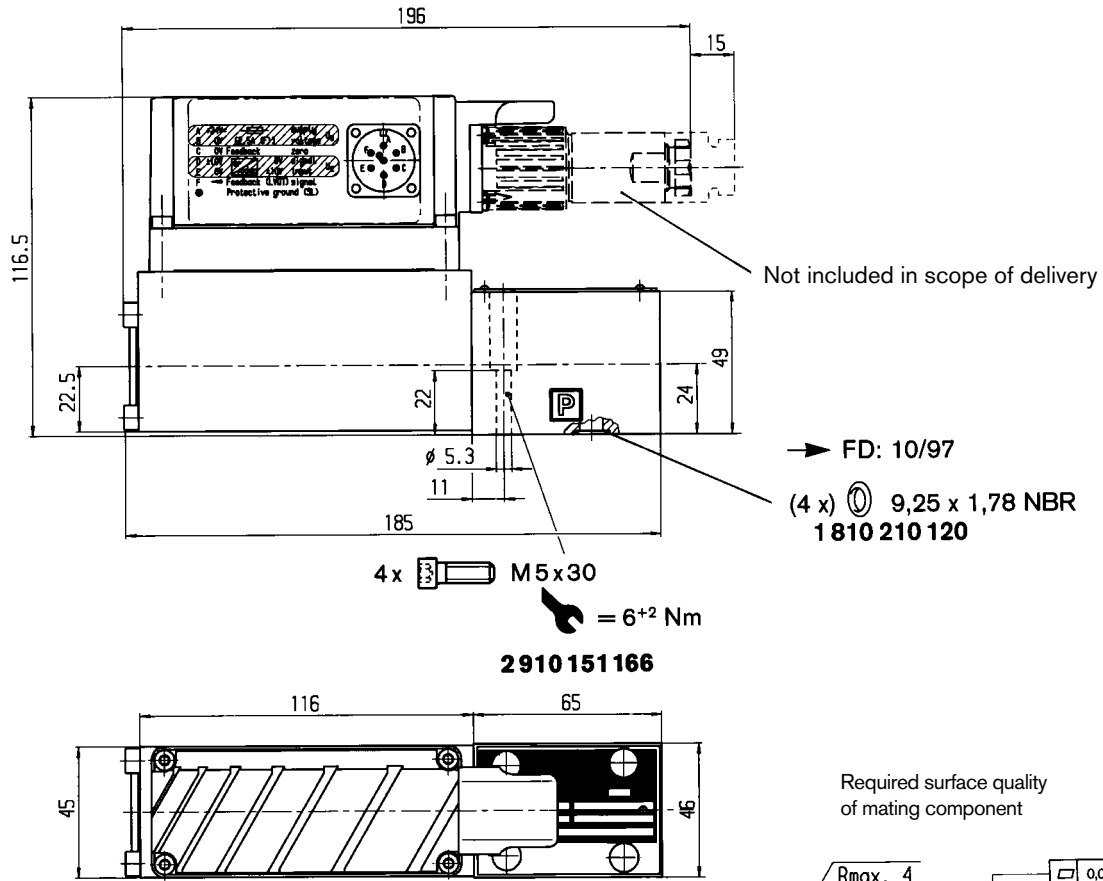


\* Factory setting at  $Q = 1$  l/min  
 $\pm 2\%$  manufacturing tolerance

<sup>1)</sup> Version:  $U_{D-E} = 0 \dots +10$  V

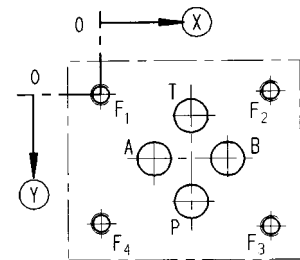
<sup>2)</sup> Version:  $I_{D-E} = 4 \dots 20$  mA

Unit dimensions (nominal dimensions in mm)



Mounting hole configuration: NG6 (ISO 4401-03-02-0-94)  
 For subplates, see catalog sheet RE 45053

- 1) Deviates from standard
- 2) Thread depth:  
 Ferrous metal 1.5 x  $\phi$   
 Non-ferrous 2 x  $\phi$



	P	A	T	B	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>
$\text{\textcircled{X}}$	21.5	12.5	21.5	30.2	0	40.5	40.5	0
$\text{\textcircled{Y}}$	25.9	15.5	5.1	15.5	0	-0.75	31.75	31
$\text{\textcircled{O}}$	8 <sup>1)</sup>	8 <sup>1)</sup>	8 <sup>1)</sup>	8 <sup>1)</sup>	M5 <sup>2)</sup>	M5 <sup>2)</sup>	M5 <sup>2)</sup>	M5 <sup>2)</sup>

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## Notes

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